

Calc Review Sheet Q2 T1

① a) $s(3) = 21$

b) $v(t) = 3t^2 - 18t + 24$

$v(3) = -3$

c) $a(t) = 6t - 18$

$a(3) = 0$

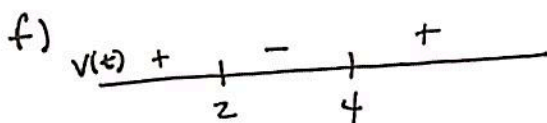
d) Object is neither: b/c $\text{accel} = 0$.

e) $v(t) = 0$

$3(t^2 - 6t + 8) = 0$

$3(t-4)(t-2) = 0$

at rest when
 $t = 2$ and $t = 4$.



moving right for
 $t \in [0, 2) \cup (4, \infty)$

g) $|s(2) - s(0)| + |s(4) - s(2)|$

$|23 - 3| + |19 - 23|$

$20 + 4 = 24$

② a) $s(3) = 6$

b) $v(t) = 3t^2 - 8t + 4$

$v(3) = 7$

c) $a(t) = 6t - 8$
 $a(3) = 10$

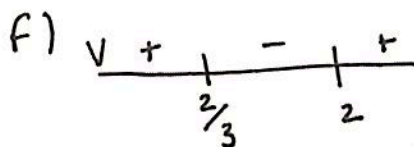
d) speeding up b/c $\text{vel.} + \text{accel} > 0$.

e) $v(t) = 0$

$3t^2 - 8t + 4 = 0$

$(3t-2)(t-2) = 0$

$t = \frac{2}{3}$ $t = 2$



moving left for $t \in (\frac{2}{3}, 2)$.

g) $|s(\frac{2}{3}) - s(0)| + |s(2) - s(\frac{2}{3})| + |s(4) - s(2)|$

$| \frac{113}{27} - 3 | + | 3 - \frac{113}{27} | + | 19 - 3 | = \frac{496}{27}$

≈ 18.370

$$3) a) y = \sin(x-3)^2 \quad \frac{dy}{dx} = \cos(x-3)^2 \cdot 2(x-3)$$

$$b) y = \sec(2x) \quad \frac{dy}{dx} = \sec(2x) \cdot \tan(2x) \cdot 2 = 2 \sec(2x) \tan(2x)$$

$$c) y = \tan \sqrt{3x-2} \quad \frac{dy}{dx} = \sec^2 \sqrt{3x-2} \cdot \frac{1}{2} (3x-2)^{-1/2} \cdot 3 = \frac{3 \sec^2 \sqrt{3x-2}}{2 \sqrt{3x-2}}$$

$$= \tan(3x-2)^{1/2}$$

$$d) y = x \cdot \cos(x) \quad \frac{dy}{dx} = -x \sin(x) + \cos(x)$$

$$e) y = \cot^2(x) \quad \frac{dy}{dx} = 2 \cot(x) \cdot (-\csc^2(x)) = -2 \cot(x) \cdot \csc^2(x)$$

$$= (\cot(x))^2$$

$$4) \text{ Point} = (1, 4) \quad \text{Slope} = -4 \quad \boxed{y - 4 = -4(x - 1)}$$

$$5) (2, -257.482) \quad \text{Slope} = -1088.106$$

$$y + 257.482 = -1088.106(x - 2)$$

$$6) a) x^2 + xy + y^2 = 4$$

$$2x + x \frac{dy}{dx} + y + 2y \frac{dy}{dx} = 0$$

$$\begin{array}{r} -2x \qquad \qquad -y \qquad \qquad -2x - y \\ \hline x \frac{dy}{dx} + 2y \frac{dy}{dx} = -2x - y \end{array}$$

$$\frac{dy}{dx} (x + 2y) = -2x - y$$

$$\boxed{\frac{dy}{dx} = \frac{-2x - y}{x + 2y}}$$

$$b) y^2 + 9x = x^2$$

$$2y \frac{dy}{dx} + 9 = 2x$$

$$2y \frac{dy}{dx} = 2x - 9$$

$$\boxed{\frac{dy}{dx} = \frac{2x - 9}{2y}}$$

$$c) 3x^2 = 2y^2 + 1$$

$$6x = 4y \frac{dy}{dx}$$

$$\boxed{\frac{6x}{4y} = \frac{dy}{dx}}$$

$$d) x^2 - y^2 = 2xy$$

$$2x - 2y \frac{dy}{dx} = 2x \frac{dy}{dx} + 2y$$

$$2x - 2y = 2x \frac{dy}{dx} + 2y \frac{dy}{dx}$$

$$2x - 2y = \frac{dy}{dx} (2x + 2y)$$

$$\boxed{\frac{2x - 2y}{2x + 2y} = \frac{dy}{dx}}$$

$$e) x^3 + xy + y^3 = 4$$

$$3x^2 + x \frac{dy}{dx} + y + 3y^2 \frac{dy}{dx} = 0$$

$$x \frac{dy}{dx} + 3y^2 \frac{dy}{dx} = -3x^2 - y$$

$$\frac{dy}{dx} (x + 3y^2) = -3x^2 - y$$

$$\boxed{\frac{dy}{dx} = \frac{-3x^2 - y}{x + 3y^2}}$$

$$f) 2 = 4x + 3x^2 y^2$$

$$0 = 4 + 3x^2 \cdot 2y \frac{dy}{dx} + 6xy^2$$

$$0 = 4 + 6x^2 y \frac{dy}{dx} + 6xy^2$$

$$-6xy^2 - 4 = 6x^2 y \frac{dy}{dx}$$

$$\boxed{\frac{-6xy^2 - 4}{6x^2 y} = \frac{dy}{dx}}$$

$$g) \frac{1}{y} + \frac{1}{x} = 2$$

$$y^{-1} + x^{-1} = 2$$

$$-y^{-2} \frac{dy}{dx} - x^{-2} = 0$$

$$-\frac{1}{y^2} \cdot \frac{dy}{dx} - \frac{1}{x^2} = 0$$

$$-\frac{1}{y^2} \cdot \frac{dy}{dx} = \frac{1}{x^2} \cdot \frac{1}{-1}$$

$$\frac{-1}{y^2}$$

$$\boxed{\frac{dy}{dx} = -\frac{y^2}{x^2}}$$